

SolMaT—The Solar Thermal Manufacturing Technology Initiative

SolMaT works with manufacturers to lower the costs of manufacturing components for concentrating solar power systems.

Cost-effective design and manufacturing of concentrating solar components are critical to the successful deployment of concentrating solar power (CSP) technologies. SolMaT, the Solar Thermal Manufacturing Technology initiative, aims to reduce the cost of CSP technologies in an environment of uncertain future sales and modest initial production volumes. SolMaT assists concentrating solar manufacturers in the development of cost-effective products before market demand will support high-volume production.

SolMaT, in collaboration with private industries,

- develops the manufacturing technology and processes that permit cost-effective

deployment of solar power systems in early commercial applications at low-volume levels of production

- reduces uncertainty in the cost and long-term reliability of key solar components
- improves manufacturers' ability to finance and warrant early systems
- establishes the manufacturing basis for achieving the substantial cost reductions that are possible through higher-volume production in the future.

Partnering With Industry

Under SolMaT, the U.S. Department of Energy's Concentrating Solar Power Program



Warren Greitz, NREL/PIX05256

SAIC installed this new heliostat for performance testing at the Mesa Top Test Facilities at NREL in July 1997.



has cost-shared subcontracts with three companies. Each subcontract began with a study of the potential for cost reduction, which led to the building and testing of hardware.

SAIC. Science Applications International Corporation (SAIC), Golden, Colorado, is developing cost-effective technologies for manufacturing heliostats. Heliostats are the major component (about 40% or more of the cost) of a power tower plant. In phase 1 of their contract, SAIC evaluated several significant design modifications that could lead to substantial manufacturing cost reductions. Real cost savings can now be achieved because SAIC was able to manufacture a multi-use mirror constructed of stainless steel and thin glass that can be used in heliostats as well as dish concentrators. SAIC estimates a heliostat cost reduction of about 40%—a heliostat that was once manufactured for \$160.00/m² of reflective area can now be manufactured for \$113.00/m² of reflective area, reducing the labor costs for producing heliostats by 70%.

Phase 1 of the study was completed in FY 1996. Phase 2 now calls for building four heliostats to validate its projected cost reductions in manufacturing. One heliostat installation was recently completed at the National Renewable Energy Laboratory test site in Golden, Colorado; another heliostat will be installed at Sandia National Laboratories' (SNL) test facility in Albuquerque, New Mexico, in the fall of 1997; and two heliostats will be installed at the Solar Two power tower in Barstow, California, in late 1997. A test and evaluation program at these installations will help SAIC confirm cost estimates for manufacturing heliostats and prove the performance of the new design in the field.

Phase 3 of the contract with SAIC, currently in the planning stage, will involve the installation of a number of additional heliostats for testing and evaluation in 1998-1999.

Rocketdyne. Rocketdyne Division of Boeing North American, Canoga Park, California, is making several manufacturing and design improvements to its molten-salt central receiver, which is currently being used at Solar Two. The complex design of the receiver is composed of 24 interconnected panels that each include 32 tubes. Rocketdyne found that improvements in design and fabrication of these panels could save approximately \$1.3 million in capital costs. In addition, operating and maintenance costs could be reduced by about \$240,000 per year as a result of a more reliable control system and instrumentation. Increased plant availability of about 3% could also result from improved instrumentation.

These cost reductions and design improvements can serve to reduce the levelized energy cost from the solar portion of a power tower by 4.4%. This reduction is significant because the receiver comprises less than 14% of the capital cost for the solar portion of the plant.

Rocketdyne has constructed a single full-scale receiver panel for installation at Solar Two in the summer of 1997. Rocketdyne will also fabricate a smaller panel, one with 8 tubes rather than 32, for installation and performance testing at SNL. These installations will help Rocketdyne determine with more certainty the manufacturing cost for its receiver and prove performance of the new design.

MDA. McDonnell Douglas Aerospace (MDA), Huntsville, Alabama, started a project in FY 1996 aimed at reducing the cost of manufacturing dish/engine concentrators. Work is ongoing as MDA assesses the feasibility of using composite materials in the concentrator structure, the facet support, and the attachment between the facet and the concentrator. If phase 1 of the study reveals the potential for cost reductions, phase 2 will proceed with further validation, fabrication, and testing of the concentrators.

Future Activities

The SolMaT initiative will continue to advance CSP technologies by

- identifying the most important manufacturing barriers impacting early commercial sales,
- conducting manufacturing studies of prototype components to develop and optimize the key processes needed for low-volume manufacturing of solar components,
- developing and demonstrating special manufacturing processes and tooling, and
- scaling up existing prototype-level manufacturing approaches by exploiting significant deployment opportunities.

For on-line information about the U.S. Department of Energy's Concentrating Solar Power Program, please visit its web site: <http://www.eren.doe.gov/sunlab>

For more information on renewable energy or for additional copies of this brochure, contact the Energy Efficiency and Renewable Energy Clearinghouse (EREC): 1-800-DOE-EREC (363-3732)



Produced for the
U.S. Department of Energy (DOE)
1000 Independence Avenue, S.W.
Washington, DC 20585-0121



Produced by Sun•Lab:
Bringing together solar energy expertise from
Sandia National Laboratories and the National
Renewable Energy Laboratory, DOE national
laboratories.

DOE/GO-10098-566
April 1998



Printed on recycled paper